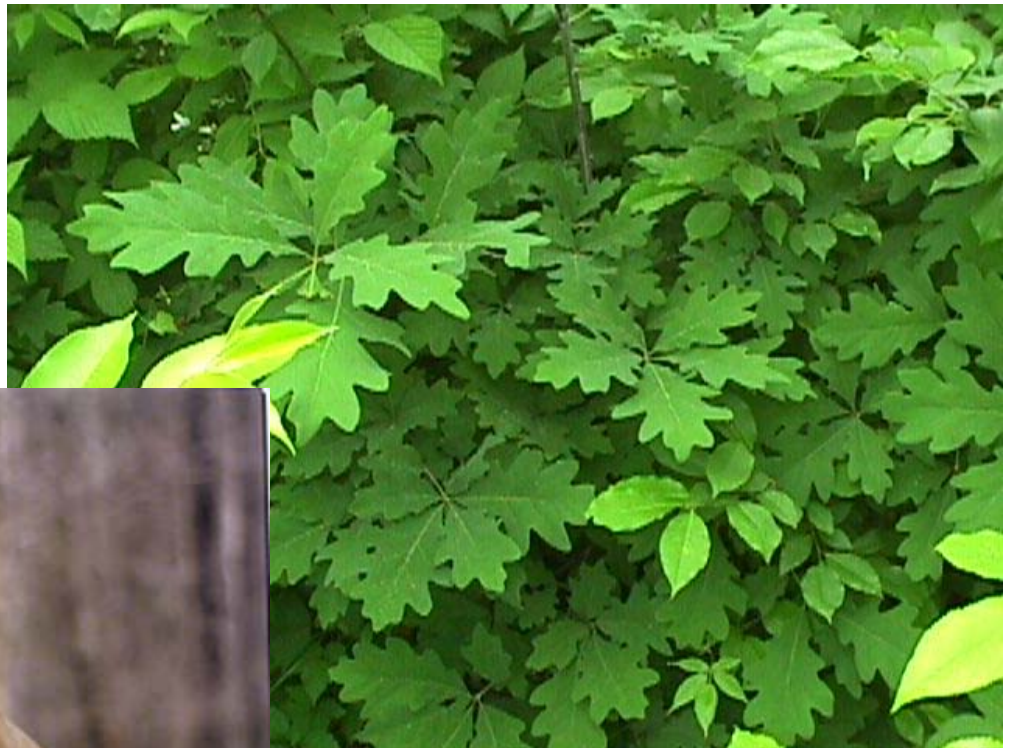


Quabbin Reservation White-Tailed Deer Impact Management Program: Results from 2005



Department of Conservation and Recreation
Division of Water Supply Protection
Natural Resources Section
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dcr
Massachusetts



I. BACKGROUND

In 1991 Quabbin Reservation was opened to limited, controlled public deer hunting after 50 years without hunting. This action was in response to growing concern about the impacts of deer browsing on forest regeneration and the potential long-term consequences of those impacts on water quality. Hunting has been conducted on the reservation each year since.

The controlled hunts constituted only one component of a comprehensive 1991 White-tailed Deer Impact Management Plan for the reservation that also included the use of electrified fencing and various changes in the Department of Conservation and Recreation, Division of Water Supply Protection's (Division) (formerly the Metropolitan District Commission, Division of Watershed Management) land management program. That plan called for six years of controlled hunting, followed by a major review and re-evaluation of the program. That review was conducted in the spring of 1997 when two reports (**Quabbin Regeneration: Summary Report 1988-97** and **Quabbin Reservation White-tailed Deer Impact Management Program: Results and Evaluation 1991-1996**) were issued by the Division. Also at that time, recommendations for the next phase of the program were issued in the document **Quabbin Reservation White-tailed Deer Impact Management Program: Summary Report and Proposal 1997**. Those recommendations called for a continuation of the controlled hunting program with several changes proposed to make the program more efficient.

The driving force behind the deer reduction program has always been to reduce the impacts of deer browsing to a level that allows and promotes the development of a healthy, resilient, diverse forest that can adequately and continuously protect water quality. Major components of the deer population reduction program were to 1.) Reduce population densities and 2.) Maintain those densities at a level that allows for the continued growth and regeneration of forest tree species.

After several years of controlled hunts, substantial reductions in deer population densities were achieved in all hunt areas, and the Division has been in the maintenance phase of its program for several years. The maintenance phase of the program is essential for maintaining relatively stable deer population levels and eliminating potentially large swings in deer densities that could occur if hunting were stopped for an extended period of time. In the absence of regular hunting mortality, deer populations at lower densities that have little natural mortality and an increasing food supply would expand and could jeopardize the forest regeneration progress made to date. In 2005, a five-year plan was developed that outlined proposed activities for the next five years. This report summarizes results from 2005 and outlines the program's goals and plans for 2006.

II. 2005 PROGRAM RESULTS

A. Hunter Effort and Participation

Participants in the hunts are chosen in a random lottery from a pool of licensed hunters submitting the required application form and fee. The number of hunters applying for the hunt has varied from approximately 1,050 in 2001 to over 9,500 in 1992 (Table 1). The number of hunters chosen in any one year has varied, depending on the number of areas being hunted and the number of hunting segments per area. The number of hunters applying to the Quabbin hunts has dropped sharply since 1991. The number of applications received in 2005 was a slight decrease from 2004; however the overall number of applicants was still relatively high. It is impossible to predict future trends in hunter interest, although statewide and regional trends would indicate that the hunter base and hunter recruitment is continuing to diminish. Fortunately, the number of hunters being selected has remained relatively stable since 1995 when the Division began to shift towards the maintenance phase of its program in some management blocks. Further, since 2000 only 4 of the 5 blocks are hunted annually, and fewer hunters are needed to maintain the same hunter densities.

Table 1. Number of hunters applying and selected for Quabbin deer hunts, 1991-2005.

	# HUNTERS		
YEAR	APPLYING	SELECTED	PERCENT ACCEPTED
1991	7444	1020	14
1992	9503	2089	22
1993	7052	2303	33
1994	3418	2348	69
1995	4846	1702	35
1996	2742	1503	55
1997	1790	1525	85
1998	2086	1338	64
1999	1522	1311	86
2000	1143	1020	89
2001	1057	1042	99
2002	1416	1236	87
2003	1664	1167	70
2004	2017	1484	74
2005	1792	1278	71

Hunters who had attended at least one orientation session in the past 6 years were exempt from attending a session in 2005. At the orientation, a video featuring Division rangers presented the reasons for the hunt, safety considerations, rules and regulations, sanitary concerns, procedures and related topics. Each hunter was

required to purchase an antlerless permit from MassWildlife and assigned a specific hunt area and hunting segment. All hunters were assigned to specific access gates and required to check in and out each day, thereby effecting greater control over hunter distribution.

Following the new 5-year hunting plan described in last year's report (see **Quabbin Reservation White-Tailed Deer Impact Management Program: 5-Year (2000-2004) Review and New 5-Year Plan (2005-2009)**), Pelham was excluded from hunting during 2005. The other four blocks (Hardwick, Prescott, New Salem, and Petersham) were each hunted for two days.

Bonus Antlerless Permits

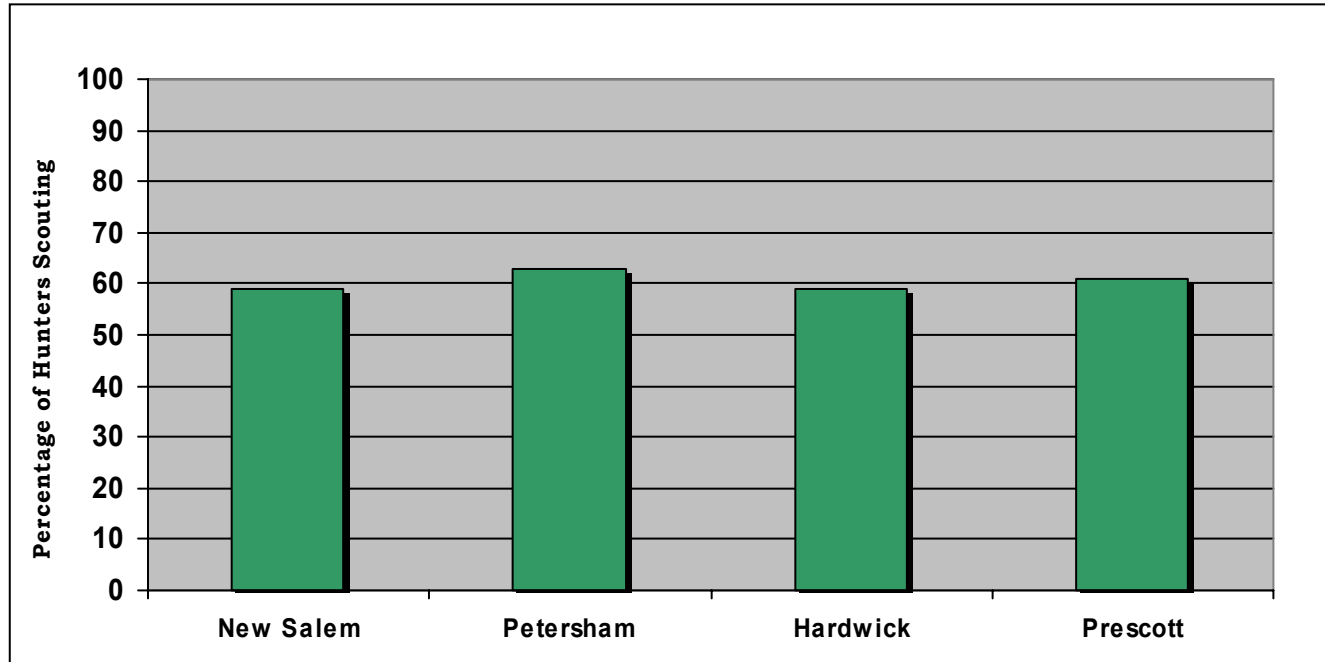
As discussed in the 2001 report, **Quabbin Reservation 5-year (2000-2004) White-Tailed Deer Impact Management Program: Program Status and Results from 2001**, the Division successfully lobbied MassWildlife to exempt antlerless deer killed at Quabbin from the statewide bag limit. All Quabbin hunters are required to purchase at least one antlerless permit prior to hunting. In response to hunter requests, extra antlerless permits (in addition to the 1 required) were made available for purchase during the orientation sessions and through the mail for hunters exempt from orientation. Hunters were allowed to purchase 1 extra antlerless permit for a total of 2 Quabbin specific antlerless permits.

Scouting

The Division has always allowed eligible hunters to access the hunt areas by foot (except Prescott), and in some areas by bicycle, for scouting prior to the hunt. However, efficient and thorough scouting is difficult because many of the hunt areas are large or restricted (Prescott). Seven years ago the Division modified the hunt program to allow vehicle access for scouting hunters. In 1999, the Division allowed 1 day of car scouting for Prescott hunters only. In 2000, the program was expanded to allow 1 day vehicle scouting for all the hunted blocks. Since 2001, the program has allowed 2 consecutive days of vehicle scouting for all hunting blocks. In 2003, scouting times were shortened by a few hours in order to conserve resources. In addition, data from previous years of scouting indicated that most hunters who scouted were only in the field for a maximum of 3 hours. Reducing the scouting hours did not appear to affect the level of participation. The participation rate for scouting prior to the 2005 hunt ranged from 59 percent to approximately 62 percent (Fig. 1).

The verbal feedback from hunters about scouting has been overwhelmingly positive. Hunters are able to efficiently scout larger areas and cover more territory. Further, car scouting allows Prescott hunters the only opportunity to visit the hunt area prior to the hunt. Car scouting will be allowed prior to the 2006 hunt in all hunting blocks.

Figure 1. Vehicle scouting participation rates for the 2005 Quabbin deer hunt.



B. Harvest Results

In 2005, 117 deer were killed (Table 2). This is a decrease from the 2004 harvest, but is similar to harvests in previous years. Harvests were down slightly in all hunting blocks.

The percentage of females in the 2005 harvest was slightly lower than the long-term average for the Quabbin hunts. The percentage of antlerless deer (females + male fawns) was about the same as the long-term average.

Table 2. Results of controlled deer hunt on Quabbin Reservation, by year, 1991-2005.

YEAR	TOTAL DEER	% FEMALE	% MALE	% A/L ¹	DEER/ Mi ² (killed)	# HUNTERS	HUNTER SUCCESS ²	Mi ² HUNTED
1991	575	60.3	39.7	71.8	40.9	855	67.3	14.1
1992	724	54.0	46.0	60.5	21.7	1971	36.7	33.4
1993	474	62.0	38.0	67.1	9.5	2168	21.9	49.7
1994	673	59.9	40.1	68.9	10.7	2118	31.6	63.1
1995	284	64.8	35.2	74.3	4.7	1508	18.8	60.9
1996	129	58.1	41.9	67.4	2.0	1213	10.6	63.1
1997	293	62.1	37.9	73.4	4.8	1207	24.3	63.1

Table 2. Continued

YEAR	TOTAL DEER	% FEMALE	% MALE	% A/L ¹	DEER/ Mi ² (killed)	# HUNTERS	HUNTER SUCCESS ²	Mi ² HUNTED
1998	123	57.7	42.3	65.9	2.3	1099	11.2	55.8
1999	112	39.3	60.7	51.8	1.8	1192	9.4	63.1
2000	106	47.2	52.8	55.7	1.7	818	13.0	49.1
2001	101	51.5	48.5	58.4	1.9	855	11.8	52.0
2002	153	48.4	51.6	64.1	3.0	967	15.8	50.2
2003	306	69.0	31.0	83.7	6.9	938	32.6	44.2
2004	167	47.9	52.1	58.7	3.0	1259	13.3	55.8
2005	117	53.0	47.0	65.0	1.8	1071	10.9	49.1
Overall	4337	avg=55.7	avg=44.3	avg=65.8	-	19239	avg= 21.9	-

¹ A/L: antlerless; females and young males with antlers less than 3 inches long.

² Hunter success is the number of deer taken per 100 hunters. Some hunters took more than one deer, so these figures slightly overestimate the proportion of successful hunters.

Female Harvest

An initially critical component to the Quabbin hunting program was to facilitate a substantial reduction in the deer herd in all management blocks. The only effective way this goal was achieved was by reducing the number of female deer in each area. Guaranteed antlerless permits, effective communication, and cooperative hunters were necessary to achieve this initial herd reduction goal. Since 1991, Quabbin hunters have been successful in both taking a large percentage of females and in reducing the deer herd in all management blocks. The percentage of females harvested during 2005 ranged from 42-64 percent. This is lower than in the early years of the hunt when the percentage of females ranged from just over 40% one year to a high of almost 80% (Table 3).

Table 3. Results of controlled deer hunt on Quabbin Reservation, by block, 1991-2005

LOCATION	YEAR	# DEER	DEER/Mi ^{2a}	DEER/HUNTER	% FEMALE
Pelham	1991	575	40.9	.67	60.3
	1992	111	7.9	.12	56.8
	1993	58	4.1	.22	56.9
	1994	50	3.6	.20	46.0
	1995	28	2.4	.12	42.9
	1996	15	1.1	.05	66.7
	1997	48	4.0	.17	56.3
	1998	22	1.9	.08	68.2
	1999	20	1.7	.07	45.0
	2000	N/A ^b	-	-	-
	2001	35	2.9	.14	48.6

Table 3. Continued

LOCATION	YEAR	# DEER	DEER/Mi ^{2a}	DEER/HUNTER	% FEMALE
Pelham	2002	59	4.1	.20	45.8
	2003	24	1.6	.08	50.0
	2004	30	2.1	.09	50.0
	2005	N/A	-	-	-
Prescott	1992	613	31.6	.58	53.5
	1993	168	8.7	.17	61.3
	1994	61	3.2	.16	60.7
	1995	44	2.3	.12	52.3
	1996	34	1.8	.10	50.0
	1997	73	3.8	.22	68.5
	1998	36	1.9	.10	52.8
	1999	39	2.0	.12	43.6
	2000	35	1.8	.11	45.7
	2001	21	1.1	.07	57.1
	2002	26	1.3	.08	53.8
	2003	N/A	-	-	-
	2004	60	3.1	.15	41.7
	2005	48	2.5	.13	54.2
Hardwick	1993	150	16.9	.30	66.7
	1994	65	7.3	.18	73.8
	1995	37	4.2	.21	51.4
	1996	26	2.9	.16	46.2
	1997	57	6.4	.34	57.9
	1998	25	2.8	.14	64.0
	1999	23	2.6	.13	43.5
	2000	30	3.4	.22	50.0
	2001	N/A ^b	-	-	-
	2002	45	5.1	.27	48.9
	2003	57	6.4	.36	64.9
	2004	32	3.6	.18	46.9
	2005	22	2.5	.11	63.6
New Salem	1993	98	13.4	.24	59.2
	1994	41	5.6	.14	46.3
	1995	27	3.7	.18	66.7
	1996	7	1.0	.05	42.9
	1997	9	1.2	.06	44.4
	1998	N/A ^c	-	-	-
	1999	9	1.2	.06	33.3
	2000	23	3.1	.16	56.5
	2001	17	2.3	.15	52.9
	2002	23	3.1	.13	47.8
	2003	13	1.8	.08	53.8

Table 3. Continued

LOCATION	YEAR	# DEER	DEER/Mi ^{2a}	DEER/HUNTER	% FEMALE
New Salem	2004	N/A	-	-	-
	2005	12	1.6	.07	41.7
Petersham	1994	456	33.9	.54	60.5
	1995	148	11.0	.26	75.7
	1996	47	3.5	.17	70.2
	1997	106	7.9	.38	64.2
	1998	40	3.0	.14	52.5
	1999	21	1.6	.09	23.8
	2000	18	1.3	.08	33.3
	2001	28	2.1	.14	50.0
	2002	N/A ^b			
	2003	212	15.8	.64	48.6
	2004	45	3.3	.14	55.6
	2005	35	2.6	.11	48.6
Overall	-		-	Avg. = 0.18	Avg. = 53.25

^a Represents the number of deer killed per square mile.

^b Area was not hunted during that year.

^c New Salem block was not hunted during 1998.

C. Hunting Block Summaries

1. SUSTAINED YIELD THEORY

Sustained yield theory (SYT) is used often in practical wildlife management. In essence, SYT uses population dynamics to generate a productivity curve. If adequate and accurate data exists on reproduction, mortality, etc. then studying the curve and the parameters used to generate it, can result in estimates of carrying capacity, maximum sustained yield, and preferred population densities (for a detailed discussion on SYT, see **Quabbin Reservation: White-Tailed Deer Impact Management Program, Results of 1998 Program and Recommendations for 1999 Program**). At Quabbin, as in most cases, the detailed information on reproduction, mortality, etc. does not exist. However, harvest statistics were used to assess the herd statistics relative to the sustained yield curve. Yearly hunter harvest, hunter effort, and an index of annual relative abundance were plotted through time to examine trends in these parameters

Yearly harvest was easily obtained and is represented as #deer killed/mi². Hunter effort was expressed as the total number of hunters in each hunting block. To estimate relative abundance, several population estimates were made using the buck:population ratio and harvest:population ratio. The buck:population ratio assumes that the number of bucks killed each year is a percentage of the total population. A ratio of 1/12 was used. The second ratio assumes hunters harvest a certain percentage of the population each year. A ratio of .20 (or 20%) was used. These ratios were

derived from biologists at MassWildlife using various models and data analysis techniques. The average from these two estimates was used to generate density (deer/mi²) estimates for each year. Density estimates from the first 1-2 years a segment was hunted were not plotted because they were typically extremely high and made the graphs difficult to interpret.

There are, however, several potential problems with using these techniques to generate density estimates. The density estimate each year is derived from the annual harvest and implies that as the deer population increases, so will the yield. Therefore, trends in yield and population will be very similar since one is based on the other. Caution is warranted because yield may not always be strictly dependant on deer populations. Factors such as weather, hunter distribution, hunter effort, and deer behavior call all influence year to year harvest rates. An independent assessment of either the deer population or the harvest rate is necessary in order to independently assess both yield and deer populations. However, in the absence of these estimates, the only alternative is to use harvest rates to roughly estimate deer populations.

Hardwick

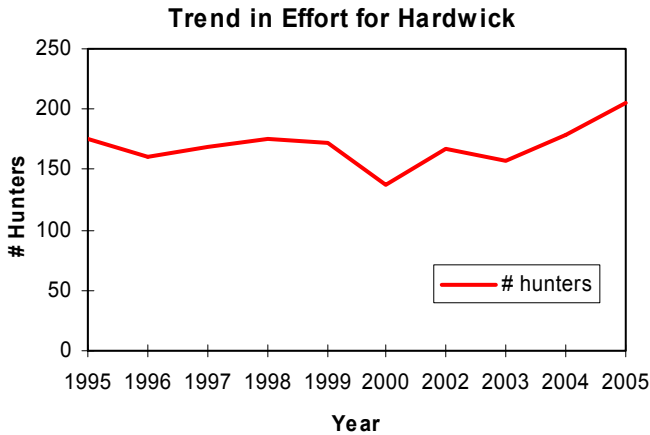
Twenty-two deer were killed in 2 days during the Hardwick hunt (Table 4). This is a decline from the previous 2 years of hunting and the lowest harvest ever recorded in Hardwick. Approximately 11% of the hunters in Hardwick successfully killed a deer. Hunter density was slightly higher than the 12-year average with approximately 1 hunter for every 28 acres.

Table 4. Results of Quabbin Reservation controlled deer hunt, Hardwick Block, 1991-2005.

YEAR	# DEER KILLED	DEER/MI ^{2A}	DEER/HUNTER	% FEMALE	# ACRES/HUNTER
1993	150	16.9	.30	66.7	34
1994	65	7.3	.18	73.8	30
1995	37	4.2	.21	51.4	32
1996	26	2.9	.16	46.2	36
1997	57	6.4	.34	57.9	34
1998	25	2.8	.14	64.0	33
1999	23	2.6	.13	43.5	33
2000	30	3.4	.22	50.0	41
2001	N/A ^a	-	-	-	-
2002	45	5.1	.27	48.9	34
2003	57	6.4	.36	64.9	36
2004	32	3.6	.18	46.9	32
2005	22	2.5	.11	63.6	28
Total	569		Avg.=0.2	Avg.= 56.5	Avg.= 33.6

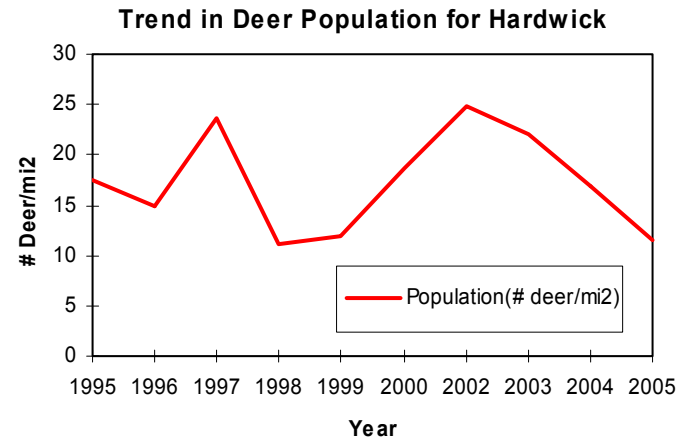
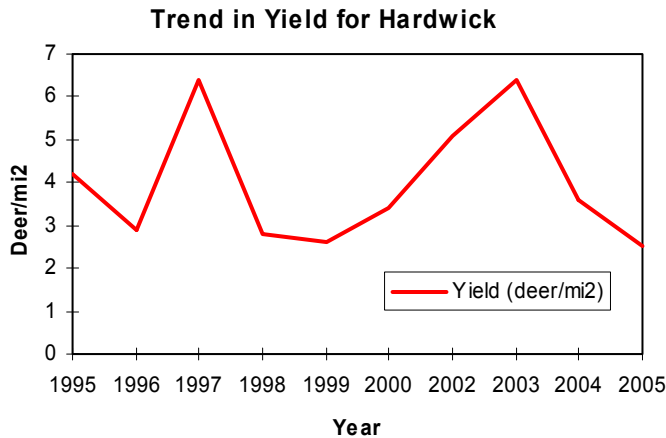
^A Represents the number of deer killed per square mile; ^B Area was not hunted during that year.

1. SUSTAINED YIELD



Trends in hunter effort for the Hardwick block have been increasing steadily since 2000. The trend for yield increased steadily from 1999-2003 and has declined steadily since then. The trend for population also increased steadily from 1999-2002 and has been declining since 2002. With an increasing trend in hunter effort and a declining trend in both yield and deer population, the population is probably on the left

side of the sustained yield curve. If trend in yield continued, the population may continue to decline or reverse the trend and grow to carrying capacity. The trend in effort should not increase further and most likely will decrease slightly or stabilize.



Petersham

Hunters killed 35 deer in 2 days of hunting in Petersham (Table 5). Around 11% of the hunters in Petersham killed a deer. Hunter density during 2005 was the same as 2003 and 2004, which is higher than the 10 year average and substantially higher than in 2001. In 2005, there was 1 hunter for every 26 acres.

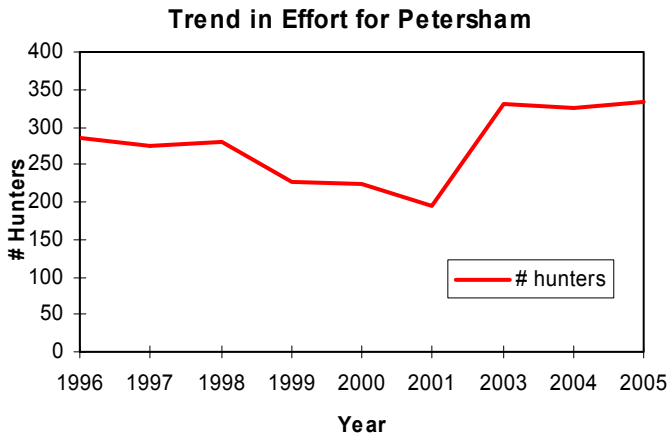
Table 5. Results of Quabbin Reservation controlled deer hunt, Petersham Block, 1991-2005.

YEAR	# DEER KILLED	DEER/MI ^{2A}	DEER/HUNTER	% FEMALE	# ACRES/HUNTER
1994	456	33.9	.54	60.5	30
1995	148	11.0	.26	75.7	31
1996	47	3.5	.17	70.2	30
1997	106	7.9	.38	64.2	31
1998	40	3.0	.14	52.5	31
1999	21	1.6	.09	23.8	38
2000	18	1.3	.08	33.3	39
2001	28	2.1	.14	50.0	44
2002	N/A	-	-	-	-
2003	212	15.8	.64	73.1	26
2004	45	3.3	.14	55.6	26
2005	35	2.6	.11	48.6	26
Total	1256		Avg.=0.24	Avg.= 55.2	Avg.= 32.0

^A Represents the number of deer killed per square mile.

^B Area was not hunted during that year.

1. SUSTAINED YIELD

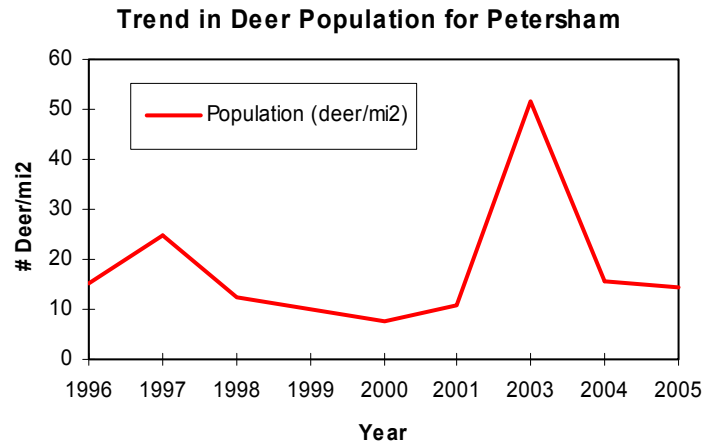
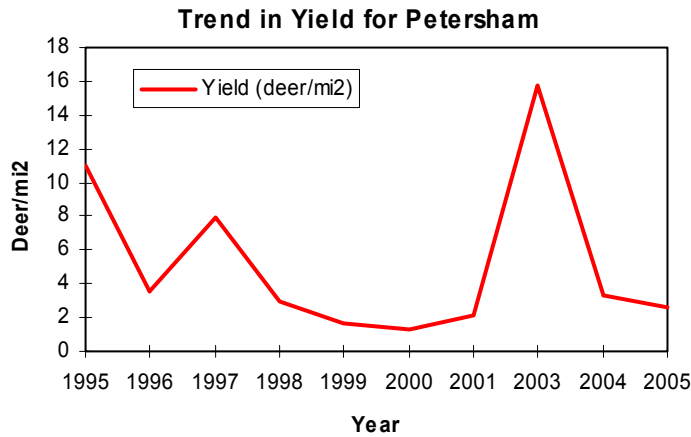


Trends in hunter effort have shifted slightly during the last 5 years.

From 1999 until 2001, there was a gradual decline in the number of hunters in the Petersham block.

From 2001-2003, the number of hunters increased to its highest point since 1995. Hunter effort has been stable since 2003. Trends in both yield and deer population showed a similar decline from 1998-2001. In 2003, harvest and the

calculated population estimate increased tremendously. Both yield and population declined dramatically during the 2004 hunt. The 2005 data shows a very slight decrease from the previous year. With such large fluctuations in both yield and calculated populations levels, it is difficult to interpret the data. Several years of a specific trend are needed to determine where the population exists on the sustained yield curve.



Prescott

Forty-eight deer were harvested in Prescott during 2005 (Table 6). Roughly 13% of the hunters successfully harvested a deer. Hunter density was slightly higher than the long-term average. There was around 1 hunter for every 34 acres of land.

Table 6. Results of Quabbin Reservation controlled deer hunt, Prescott Block, 1991-2005.

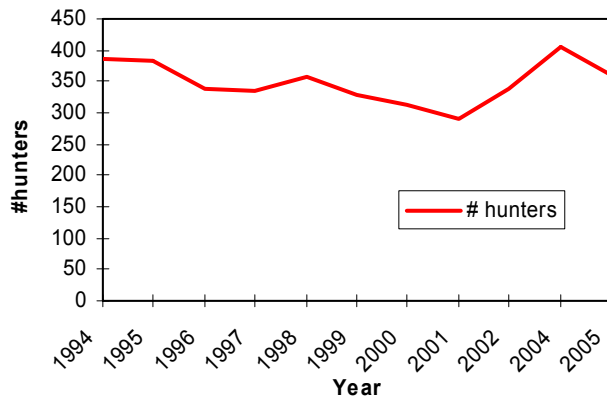
YEAR	# DEER KILLED	DEER/MI ^{2A}	DEER/HUNTER	% FEMALE	# ACRES/HUNTER
1992	613	31.6	.58	53.5	37
1993	168	8.7	.17	61.3	38
1994	61	3.2	.16	60.7	32
1995	44	2.3	.12	52.3	32
1996	34	1.8	.10	50.0	37
1997	73	3.8	.22	68.5	37
1998	36	1.9	.10	52.8	35
1999	39	2.0	.12	43.6	38
2000	35	1.8	.11	45.7	39
2001	21	1.1	.07	57.1	43
2002	26	1.3	.08	53.8	37
2003	N/A	-	-	-	-
2004	60	3.1	.15	41.7	31
2005	48	2.5	.13	54.2	34
Total	1258		Avg.= 0.2	Avg.= 53.4	Avg.= 36.3

^A Represents the number of deer killed per square mile.

^B Area was not hunted during that year.

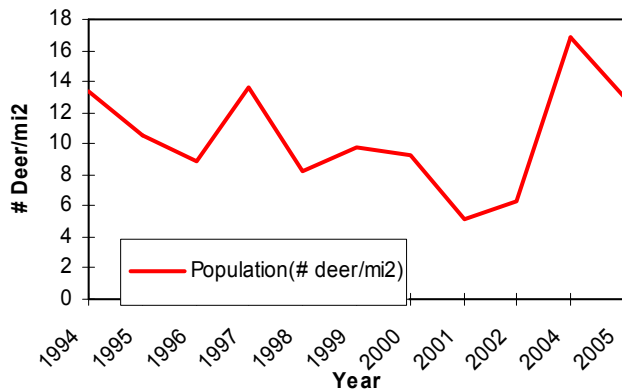
1. SUSTAINED YIELD

Trend in Effort for Prescott

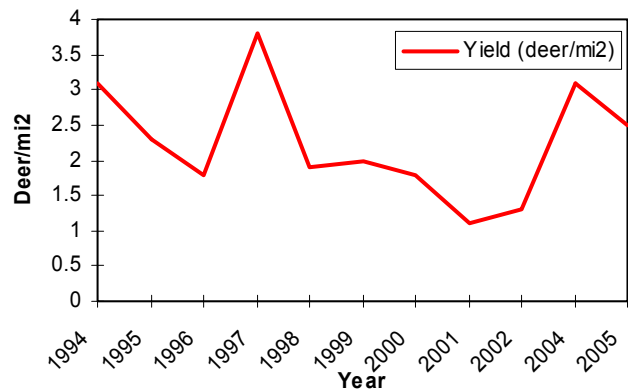


The number of hunters increased steadily from 2001-2004. Effort declined slightly during 2005. Trends for yield and deer population have also showed an increase from 2001-2004, but both declined during 2005. With a declining trend in effort, population, and yield, the population would likely reverse and begin to increase if effort were to continue to decline.

Trend in Deer Population for Prescott



Trend in Yield for Prescott



New Salem

Only 12 deer were harvested in New Salem during 2005 (Table 7). Roughly 7% of the hunters in New Salem successfully harvested a deer. Hunter density was very close to the 10-year average. There was about 1 hunter for every 34 acres of land.

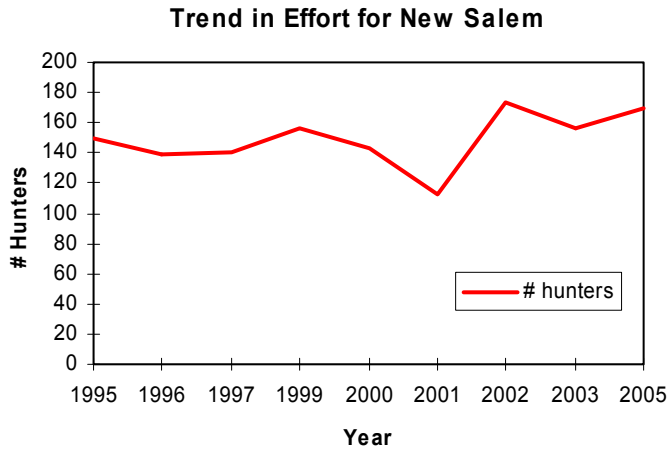
Table 7. Results of Quabbin Reservation controlled deer hunt, New Salem Block, 1991-2005.

YEAR	# DEER KILLED	DEER/MI ^{2A}	DEER/HUNTER	% FEMALE	# ACRES/HUNTER
1993	98	13.4	.24	59.2	34
1994	41	5.6	.14	46.3	33
1995	27	3.7	.18	66.7	31
1996	7	1.0	.05	42.9	34
1997	9	1.2	.06	44.4	33
1998	N/A ^c	-	-	-	-
1999	9	1.2	.06	33.3	30
2000	23	3.1	.16	56.5	33
2001	17	2.3	.15	52.9	42
2002	23	3.1	.13	47.8	27
2003	13	1.8	.08	53.8	30
2004	N/A				
2005	12	1.6	.07	41.7	34
Total	279		Avg. = 0.12	Avg. = 49.6	Avg. = 32.8

^A Represents the number of deer killed per square mile.

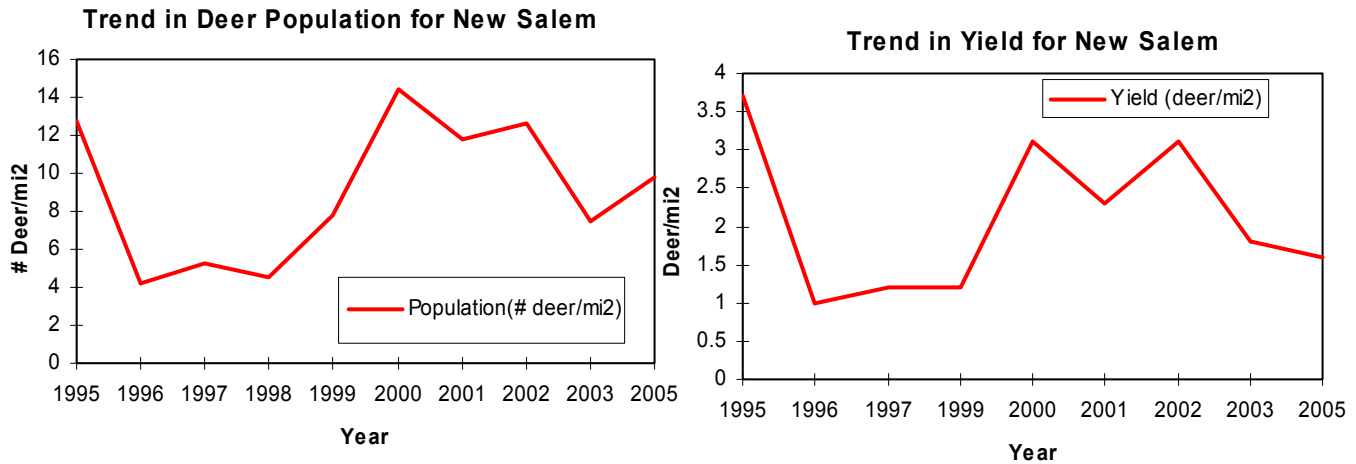
^B Area was not hunted during that year.

1. SUSTAINED YIELD



The overall trend in hunter effort has been relatively consistent except for a slight decrease in hunter effort during 2001. Trends for yield and deer population, however, are not as consistent. Both yield and population have experienced several increases and declines in the last 8 years. However, the overall trend in population has been declining since 2000. With a relatively stable effort, the declining yield and population

would indicate that either the yield may stabilize, or the population might reverse and grow to carrying capacity.



D. Program Costs

The net cost for the Quabbin controlled hunt is calculated by subtracting the total cost accrued (overtime for Division personnel, equipment rentals, printing, etc.) from the revenue received from the \$5 application fees (Table 8).

Total cost for the hunt has decreased substantially since 1991. Revenue is dependent on the number of hunter applications, and it has fluctuated yearly. In order to conserve resources and time, no “sani-bags” were handed out to hunters during the 2005 hunt. Hunters were reminded at the orientation sessions to bring along their own towels or gloves to clean themselves after handling a deer.

Table 8. Costs and revenues (in dollars) of Quabbin Reservation controlled deer hunts, 1991-2005.

YEAR	TOTAL COST ¹	REVENUE ²	NET COST
1991	109,680	37,220	72,460
1992	61,210	47,515	13,695
1993	36,621	35,260	1,361
1994	28,414	17,090	11,324
1995	23,679	24,220	(541)
1996	20,500	13,710	6,790
1997	17,343	8,950	8,393
1998	10,742	10,430	312
1999	15,192	7,610	7,582
2000	15,266	5,715	9,551
2001	11,357	5,285	6,072
2002	19,309	7,080	12,229
2003	15,910	8,320	7,590
2004	18,009	10,085	7,924
2005	15,372	8,960	6,412

¹includes overtimes costs for hunt personnel, equipment rentals and purchases, and miscellaneous other expenses.

²derived from \$5 application fee.

III. 5-YEAR MANAGEMENT PLAN: STATUS AND RECOMMENDED ACTION

A. Program Status

Results from the 2005 hunt were consistent with results from previous years. Although harvests did decline slightly in each hunting block, the overall harvest was similar to kills from 1998-2001.

New Salem continues to be a challenge. Even though New Salem was not hunted during 2004, only 12 deer were killed in the 2005 hunt. Typically, a higher harvest can be expected in blocks that were “rested” the previous year. Most likely habitat conditions play a critical role in yearly harvests. An abundance of regenerating white pine has created dense stands of forest. This represents ideal escape cover for deer, but very difficult hunting conditions for hunters. As the white pine matures and thins, visibility should improve, and harvest rates may increase.


Regeneration continues to make great strides throughout the reservation. The continued and persistent hunting pressure on resident deer populations has allowed many tree species to begin to recover. Results from last spring’s regeneration report indicate substantially higher regeneration numbers in 2004 than was found in 1989. For a complete summary see, **2004 Quabbin Regeneration Summary Report**.

B. Recommended Action

1. As regeneration continues to improve, and the forest recovers, it is important to continue to keep deer numbers at or near current levels. Therefore, the DCR proposes to continue hunting at a maintenance level in all hunting blocks incorporating the 5-year rotation outlined below (Table 9). For the 2006 hunt, Hardwick would be taken out of the rotation, and Pelham would be added back in. Each block would be hunted for one 2-day segment.

Table 9. Hunting block rotation on Quabbin Reservation, 2005-2009.

YEAR	AREAS HUNTED				
2005	Pelham	Hardwick	Petersham	Prescott	New Salem
2006	Pelham	Hardwick	Petersham	Prescott	New Salem
2007	Pelham	Hardwick	Petersham	Prescott	New Salem
2008	Pelham	Hardwick	Petersham	Prescott	New Salem
2009	Pelham	Hardwick	Petersham	Prescott	New Salem

 Indicates the block not being hunted that year.

2. Maintain adequate hunter densities

Maintaining optimum hunter densities is an important component of the Quabbin hunts, especially since hunts are short in duration. An original goal of 1 hunter per 30-35 acres was established in 1991. Since then, hunter densities have fluctuated, and in some years densities were substantially lower. The fluctuation in hunter density was a result of fewer hunter applications, so adjustments had to be made when assigning hunters to each block.

Set goals of no less than 1 hunter per 30 acres should be maintained for all hunting blocks. Hunter densities below this goal should be avoided. Maintaining hunter densities at this level will allow for an adequate number of hunters to be distributed across the hunting block, ample hunting pressure, and a more direct interpretation of harvest results.

For the 2005 hunt, hunter densities ranged from 1 hunter/26 acres (Petersham) to 1 hunter/34 acres (Prescott and New Salem). While the Petersham block had slightly higher densities than recommended, both New Salem and Prescott fell below the 30 threshold. Hunter densities in these areas should be increased slightly for 2006.

3. Design and administer a hunter survey

Surveys of Quabbin hunters were conducted in 1995 and 1996. While these surveys provided useful information, they only targeted hunters attending orientation sessions. Because considerable changes have been made to the Quabbin hunts (rotation, time of hunts, etc.) in the last 10 years, it would be helpful to administer a new survey during 2006.

The new survey would target all hunters chosen for the 2006 hunt, including those that don't need to attend orientations. Since hunters receive several mailing from the Division, there is ample opportunity to include a short survey with their paperwork. Results of the survey will be used to fine tune how the Quabbin hunts are administered and address potential concerns the hunters may have.

4. Control hunter distribution

Effectively distributing hunters throughout any of the hunting blocks has continued to be a challenge. Some blocks (Prescott and Petersham) are extremely large, and it is easy to have hunters clump in certain areas, while other large tracts of land remain essentially unexplored. In order to address this concern, the Petersham block had 2 access points during the 2005 hunt. Hunters were not assigned a specific entry gate, but 2 access gates (Gate 40 and 31) were made available only during the morning

to allow hunters to enter into the northern or southern portion of the hunting block. All hunters had to leave the hunt zone at the end of the day through Gate 40. Having 2 access points during the morning allowed hunters more direct access to the northern portions of the Prescott block. Approximately 40 hunters entered through the northern gate.

A 2 gate system (for the morning only) will continue during the 2006 hunt in the Petersham block. Having 2 access points was also considered for the Prescott block during the 2005 hunt, however this was not implemented. In the future, the Prescott block may allow 2 access points.

5. Develop an independent assessment of deer harvest rates or relative abundance

Determining the relative abundance of deer populations at Quabbin strictly from harvest data is a difficult task. The inherent assumption is that as deer densities increase or decrease then harvest rates will also go up or down. However, because Quabbin hunts are very short in duration and influenced by a variety of factors, this assumption may not be valid. It is highly unlikely that deer harvests in Petersham in the years prior to 2003 were indicative of a low density deer herd. In reality, the deer herd in Petersham was most likely growing over a period of years, but the harvest did not reflect this trend for a number of reasons (low hunter density, poor hunter distribution, etc.). In order to more accurately assess the relative abundance of deer in any particular hunting block, an independent assessment of the herd is critical.

This independent assessment can be accomplished through a variety of different techniques that vary in the amount of resources or personnel needed to accomplish them. Some examples include:

1. Spotlight surveys
 - a. Conducted primarily at night along pre-determined routes to document the number of deer seen
 - b. Provides an estimate of relative abundance
 - c. Can be used to determine doe/fawn ratios
2. Capture and marking
 - a. A known sample of deer are captured and marked (ear-tagged) and the number of marked deer harvested can be used to generate population estimates and harvest rates
3. Distance sampling
 - a. Technique that was used in the Quabbin Park study
 - b. Provides density estimates
 - c. Very labor intensive
4. Browse Surveys

- a. Amount of browse can be related to the relative abundance of deer
- b. Key indicator plant species could also be monitored
- c. Caution must be used to separate deer from moose browse

Efforts will be made to institute at least one of the techniques to provide additional data on the Quabbin deer herd. This independent assessment of the deer herd will be helpful when examining harvest data and making specific management recommendations.

C. Other Hunt Changes

For the most part, the Quabbin controlled hunts will be managed much like they have been in the past 6 years. Hunters will be allowed to apply in groups of up to 6 people. Each hunter's license number on the application will be included in the random drawing. Like last year, the Division is allowing hunters to skip the orientation if they have been to one in the last 6 years.

Antlerless deer killed at Quabbin will still be considered "bonus" and not count towards a hunter's statewide bag limit. Efforts were made to change current regulations that restrict Quabbin hunters to harvesting only 2 deer. Statewide regulations, outside Quabbin, allow hunters to harvest as many deer as their permits allow. Currently, Quabbin hunters are restricted to harvesting only 2 deer, regardless of the number or types of permits they possess. Conversations with staff at MassWildlife indicated that the regulations would remain the same.

Regular operational components will not change. Portable sanitary facilities will be placed throughout the hunt areas. In addition, the 4:00 p.m. checkout time will remain in effect, and all hunters must check in and out of the hunt each day. Biological data will continue to be collected on all harvested deer.

The Quabbin deerhunt application will again be made available on the Division website for downloading and printing. This year the application will ask hunters about their FID card. Expired cards continue to be a problem at the Quabbin hunt. Hopefully, asking for FID information on the application will remind hunters to renew their card if it has expired. This year the hunt application will be slightly modified to make data entry easier and more efficient. Instead of blank lines on the application, there will be small blank boxes for the hunter information. This will force hunters to more carefully and clearly write their information. Currently, a large amount of time is spent deciphering and correcting information that is illegible.

The Division will again allow 2-day vehicle scouting for all hunting blocks this fall. Last year, the Division allowed all hunters the opportunity to drive into their hunting block for 2 days of scouting. These 2-day vehicle scouting opportunities will hopefully improve hunter distribution and hunter success. Finally, the Division will try

to continue with its check-in/check-out procedure. The check-in procedure uses perforated cards with unique numbers. This allows hunters to simply hand a number to the check station attendant and then leave, without having to wait for a card to be returned.

Applications for the 2004 and 2005 Quabbin hunt included a section that asked hunters to indicate their willingness to hunt an additional segment. This featured allowed the Division to identify hunters who were willing and able to be placed in a second hunting segment in the event that there were too few applicants to fill a segment during the initial random drawing. While the Division did not need to use this option during the 2004 or 2005 hunt, this feature will remain on the 2006 application in case hunter interest declines.

D. Quabbin Park

The Division continues to have internal discussions regarding the management of Quabbin Park. The 2003 population study report indicated an extremely high deer density within the park. In addition, recent regeneration surveys within the park indicate a relatively low number of woody stems. The large number of deer within the Park has a potentially large impact on a variety of things. Internal discussions have touched on a diversity of topics including:

- a. The large deer herd and the associated abundance of deer ticks and rate of Lyme disease
- b. The effects of the deer herd on regeneration on Park lands both on and off watershed
- c. The potential of the deer herd within the Park to serve as a source population for other areas of the Reservation and serve as a refuge during times when other areas of the Reservation are hunted.
- d. A variety of public opinions regarding the deer herd within the Park and how they should be managed (if at all).

The Division will begin to assess the problems of high deer densities within the park, including the impact on rare and endangered species, the relative contribution of the park to water resources, and the effects of minimal regeneration. Because of the sensitive nature of the Park, any management decisions will be presented separately in an independent report.

E. Paraplegic Hunting

Quabbin Reservation has hosted a paraplegic hunt for the last 6 years. This hunt is held in October each year outside the regular deer hunting season. Typically 4-6 hunters participate in the hunt, and approximately 9 deer have been harvested over the last 6 years. Hunting has taken place in a variety of locations around the administration

building with Quabbin Park. Quabbin Reservation will continue to host the paraplegic hunt each year, with the location of the hunt being determined by late summer.